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maintaining sixteen thousand lamps, even if only a fifth part would be in use at one time, and also for supplying power to small motors, is still in doubt. At present power is not supplied. It was intended that the system should be used for supplying power in the day-time, and light at night.

Leaving the central station in New York, Dr. Hagen then proceeds to inspect the village plant at Roselle, N.J., and studies this new and promising development of electric lighting, of which there are already several examples in the United States, notably that at Brockton, Mass. At Roselle three so-called two-hundred-and-fifty-light machines are installed, which are driven by a thirty-five-horse power engine. The price is a dollar per thousand candle hours (*kerzenstunde*). The electromotive force of the machine is 320 volts, and the current per lamp $\frac{48}{100}$ of an ampère. The number of lights in practical use is 800. The greatest distance to which the system is carried at present at Roselle is about 4,500 feet.

The writer then discusses the system of the U. S. electric-lighting company, which uses the Weston machine and the various modifications of the Maxim lamp, also the Bernstein electric-lighting system. The author closes his interesting and valuable discussion of the various systems of incandescent lighting by a *résumé* of the measurements made at Munich and at Paris, and an analysis of the cost of the Edison system. In this chapter will be found statements of the cost of this system from various agents of mills which are lighted by the incandescent light. So many elements peculiar to each installation enter into this analysis, that it is impossible to say in general what the cost of electric lighting is. Each business-man must decide for himself whether it is economical, on the whole, for him to use the electric light or not. In many cases there is decided advantage, and even economy, in its employment.

Dr. Hagen details in a graphic way the hopes raised by the various storage-batteries, and the leaden thoughts of those who have had their hopes dispelled. These batteries at present are useful only in laboratories.

The third portion of Dr. Hagen's treatise is devoted to arc-lighting, and in it the systems of Brush, of Weston, and of Thomson-Houston, are fully described. The treatise closes with a short essay on the dangers of electric lighting, and a copy of the regulations adopted by the board of fire-insurance inspectors in Boston.

NOTES AND NEWS.

MR. HENRY LOMB of Rochester, N.Y., has offered, through the American public health association, the sum of \$2,800, to be awarded as first and second prizes for papers on the following subjects:—

1°. Healthy homes and foods for the working-classes: first prize, \$500; second prize, \$200. Essays to be of a practical character, devoid, as far as possible, of scientific terms. They must be within the scope and understanding of all classes, and designed especially for a popular work. 2°. The sanitary conditions and necessities of schoolhouses and school-life: first prize, \$500; second prize, \$200. 3°. Disinfection and individual prophylaxis against infectious diseases: first prize, \$500; second prize, \$200. 4°. The preventable causes of disease, injury, and death, in American manufactories and workshops, and the best means and appliances for preventing and avoiding them: first prize, \$500; second prize, \$200.

All essays written for the above prizes must be in the hands of the secretary, Dr. Irving A. Watson, Concord, N.H., on or before Oct. 15, 1885. It is expected that arrangements can be made to have these essays widely distributed to the public, and to the persons most interested in the respective subjects in the United States. The American public health association earnestly appeals to those able to compete, to take part in this work, which, it is believed, will do much to augment the health, comfort, and happiness of the people.

— In addition to the issue of its regular publications, the Leander McCormick observatory of the University of Virginia (Professor Ormond Stone, director) has begun the issue of a series of circulars, of which the number just received contains the elements and ephemeris of the small planet Barbara No. 234. The elements and perturbations by Jupiter were computed by Mr. S. M. Barton; and the perturbations by Saturn and the ephemeris, by Mr. F. P. Leavenworth.

— The quinquennial prize offered by the Belgian government for researches in mathematical and physical science has been awarded to Professor Le Paige of the University of Liège, for his investigations in the higher geometry, and especially for those relating to lines and surfaces of the third order.

— The valuable Cohen collection of Egyptian antiquities, which has recently been acquired by the Johns Hopkins university, will be of great interest, not only for art, but for the historical study of the customs and laws of Egypt. It was begun in 1832 by Col. M. I. Cohen, during his travels in Egypt, and consists of six hundred and eighty-nine objects, procured mainly in the localities where they were originally discovered. A number of objects, however, belonged to the famous collection of Mr. Salt, her Majesty's consul in Egypt, which was sold in 1835. The collection consists chiefly of small works illustrating the history of the minor arts in Egypt

from the xviii. dynasty to that of the Ptolemies. The university has also purchased casts, on a reduced scale of 1:10, of the two pediments of the temple of Zeus at Olympia. They had recently been executed at Berlin, under the direction of Curtius and Hirschfeld, by the sculptor Grüttner.

— E. and F. N. Spon announce as in preparation, 'Electricity in the house,' by E. Hospitalier, translated by C. J. Wharton; also "The animal food-resources of different nations, with mention of some of the special dainties of various people derived from the animal kingdom," by P. L. Simmonds.

— Specific characters of considerable importance are found in the position of the resin-ducts and development of the hypoderm cells in the leaves of Abietineae, especially in the perplexing genus *Abies*. The value of these characters is recognized by special students of Coniferae; and material for the more general study of the structure of the leaves of all the North-American species, exclusive of those of Mexico, is now available for botanists. Mr. J. D. King of Cottage City, Mass., director of the department of microscopy in the Martha's Vineyard summer institute, has prepared and offers for sale microscopic sections of the sixty species of Abietineae of the United States. The sections are cut as thin as practicable, varying from a hundredth to an eight-hundredth of an inch, and are so prepared by bleaching and double staining as to show the cross-section and the whole structure of the leaf very perfectly. These specimens are prepared from material collected in connection with the census investigation of the forest wealth of the United States, and were supplied for the herbarium of the Arnold arboretum by Professor Sargent.

— The crisis in the grain trade, and the American and Indian competition in this commodity, are the topics of the day in Russia, and are being discussed in no less than three societies in St. Petersburg, each of them devoting more than one session to these topics.

— The need of a periodical of high character, devoted to the advance of archeological studies, and to the promotion of interest in them in America, is widely felt; and, to supply this need, it is proposed to publish quarterly, under the title of *The American journal of archaeology*, a journal devoted to the study of the whole field of archeology, — oriental, classical, early Christian, mediaeval, and American. The Archaeological institute of America has recognized the journal as its official organ. The following is a list of the editorial staff, so far as at present formed: advisory editor, Professor Charles Eliot Norton of Harvard college; managing editor, Dr. A. L. Frothingham of Johns Hopkins university, to whom all communications should be addressed; special editors, Dr. A. Emerson of Johns Hopkins university, Mr. T. W. Ludlow of New York, Professor Allan Marquand of Princeton college, Mr. A. R. Marsh of Harvard college, and Mr. Charles C. Perkins of Boston. A reserve fund is required in order to meet the deficit which must occur during the first few years of the

journal's existence. Contributions to it are solicited, and may be forwarded to the Safe deposit company of Baltimore, which acts as trustee of the fund. Notification of such remittances should be made to the managing editor.

— Professor Spörer, at a recent meeting of the Berlin meteorological society, gave a brief sketch of the present period of sun-spots. The spot-periods being counted from minimum to minimum, the commencement of the present spot-period was to be referred to 1878. So far as had hitherto been observed, the present was distinguished from the last two spot-periods by two peculiarities, — first, that the maximum in the present period appeared to have occurred four-tenths of a year later than in the previous periods; and, second, that during the maximum, the distribution of the solar eruptions showed an essentially different character from that usually obtaining. In the former periods it was observed during the maximum that the greatest concourse of spots surrounded with faculae occurred in the median latitudes of the sun; that they were completely wanting towards the poles, became less numerous also towards the equator, and only at the equator itself did they again become somewhat more crowded. In the rotation of the sun, those eruptions showed a heliographic displacement towards the equator, in contrast to the spots free from faculae, which, in the course of rotation, wandered towards the poles. During the minima of the spot-periods the maximum of the eruptions was generally found in the neighborhood of the equator. In the present period, again, the greatest concourse of eruptions surrounded with faculae was found towards the equator during the maximum as well, — a phenomenon usually occurring at the time of the minimum. The present, on the other hand, resembled former periods in the circumstance that it was only on rare occasions that the concourse of spots was alike on both hemispheres of the sun. In the majority of cases, either the northern hemisphere presented a more copious display of spots than the southern, or the southern mustered them in larger numbers than the northern.

— The inhabitants of the small town of Gelnhausen, in Hesse, are putting up a bronze memorial bust of their distinguished townsman, Philipp Reis, as the inventor of the musical telephone.

— The Italian explorer, Capt. Cecchi, has sailed for the west coast of Africa in the *Garibaldi*.

— The lack of amusements at San Diego, Cal., is causing some talk of establishing a botanic and zoölogical garden. The great natural advantages, especially of climate, would make such an institution, in competent hands, of great practical utility and scientific value, and far less expensive to sustain than in the Atlantic states.

— Mr. Tresca reports to the French academy in the *Comptes rendus*, Oct. 6, that a system of electric lighting, including both arc and incandescent lamps, was arranged from the electrical exposition building in Turin over a distance reaching to 40 kilometres (24.2 miles). The committee of the exposition, in-

cluding Gaulard, Gibbs, and Tresca, established a circuit between the station of Lango and intermediate stations,—a circuit of which the total length was 80 kilometres (about 50 miles). The wire was of uncovered chrome bronze 3.7 millimetres in diameter. The current was produced by a Siemens alternating machine of the thirty-horse power type. New forms of secondary generators devised by Gaulard and Gibbs enabled the following different types of electric lighting to be maintained: 1°. At the exposition building, 9 Bernstein lamps, 1 Soleil lamp, 1 Siemens lamp, 9 Swan lamps, and 5 other Bernstein lamps placed at a short distance (these lamps required different potentials); 2°. At the station of Turin Lango, distant 10 kilometres, 34 Edison lamps of 16-candle power each, 48 of 8-candle power, and 1 Siemens arc-lamp. On the 29th of last September the system included the station of Lango, distant 40 kilometres, where 24 Swan lamps, requiring 100 volts, were maintained with perfect regularity.

—At Memphis, Tenn., on the Mississippi River, a caving bank rises straight up from the water's edge at its base to a height of from ten to fifty feet. To check the steady disintegration and undermining from the action of the current, the U. S. engineers are employing a method of protection which has been successfully tried at other points on this river. A blanket or willow and pole mattress is placed along the slope of the bank from high-water mark to the bed of the river. These mattresses are some fifty feet wide and from two hundred to a thousand feet long, of flexible willows bound together by poles and wire. They are made on boats having a length equal to the width of the mattress, and are built on an inclined platform, from which they slide down into the water as fast as woven. They are weighted and sunk by stones, and further secured by stakes. The sunken mattresses prevent undermining below the low-water line; and the grading-down of the overhanging bank, by jets of water thrown by powerful steam-pumps, stops all undermining above that line. The space between the upper edge of the mattresses and the top of the bank is protected with willows and stone.

—In some recent investigations on the growth of leaves, published in the *Journal of the society of arts*, Messrs. Zoller and Rissmüller have shown, that while in early summer the leaves of plants contain very considerable amounts of nitrogen, phosphoric acid, and potash, these substances are withdrawn into the wood of the tree with the advancing season; so that before the leaves fade they have lost the larger part of what was most valuable in them, which the tree retains for its future use. In some of these investigations on the leaves of the beech-tree, it was shown that in their water-free substance the highest 'percentage amount' of nitrogen, phosphoric acid, and potash, is found when they open or expand in the month of May, and this percentage quite regularly decreases till they ripen and fall; but the absolute amount of nitrogen, phosphoric acid, and potash, is greatest in July, and from that time on decreases.

—Mr. I. Millard Reade, C.E., F.G.S., in his presidential address to the Liverpool geological society on the denudation of the two Americas, showed that 150,000,000 tons of matter in solution are annually poured into the Gulf of Mexico by the Mississippi. This, it was estimated, would reduce the time for the denudation of a foot of land over the whole basin from a foot in six thousand years to a foot in forty-five hundred years. Similar calculations were applied to the La Plata, the Amazons, and the St. Lawrence, Mr. Reade arriving at the result that an average of a hundred tons per square mile per annum are removed from the whole American continent. This agrees with results he previously arrived at for Europe: the whole drainage into the Atlantic, if reduced to twenty kilometres at two tons to the cubic yard, would equal a cubic mile every six years.

—The nectar secretion from Aphides is a well-known product. In many cases, however, notably the larch plant-louse, the lice so mimic the twigs on which they rest, that their presence is hard to detect, especially as the lice are often confined to the upper branches of the trees. Often this nectar is secreted so abundantly, that the leaves, and the grass beneath the trees, are covered at early morning by drops so large that it is easy to collect a considerable quantity of the nectar. Sufficient of this nectar can be secured directly from the larch lice and the elm cock's-comb gall lice to test it. Bees are also known to gather it in large quantities. This Aphis nectar is very pleasant and wholesome, and unquestionably forms at times no inconsiderable portion of our most beautiful honey. Such honey is light-colored, pleasing to the taste, and perfectly safe as a winter food for bees. The truth of this statement is sustained by the fact that the bees work freely on such nectar, even though the flowers are yielding abundant nectar at the same time. The bees themselves practically proclaim the excellence of this Aphis nectar.

—The Royal observatory of Brussels has issued the second part of the report upon the transit of Venus of 1882. Two parties were sent out by the Belgian government, one of which located at San Antonio, Tex.; the other, at Santiago, Chili. This portion of the report contains a brief narrative of the experiences of each party, and the detailed observations which were made. The positions of Venus on the disk were determined solely by micrometric observations, which were successfully made at both stations, though clouds materially interfered with the work at San Antonio. Observations for time, latitude, longitude, and meteorological observations, are also given, and a chart is appended containing sketches of the optical phenomena noted at the times of contact. This report forms the second part of volume v. of the 'Annals of the observatory.'

—In No. 101, in the article by Mr. W. C. Winlock, entitled 'Comets and asteroids of 1884,' the date of the perihelion passage of Wolf's comet should be changed from Sept. 26 to Nov. 17. The name of asteroid (237) is 'Coelestina,' while 'Hypatia' is the name of (238).